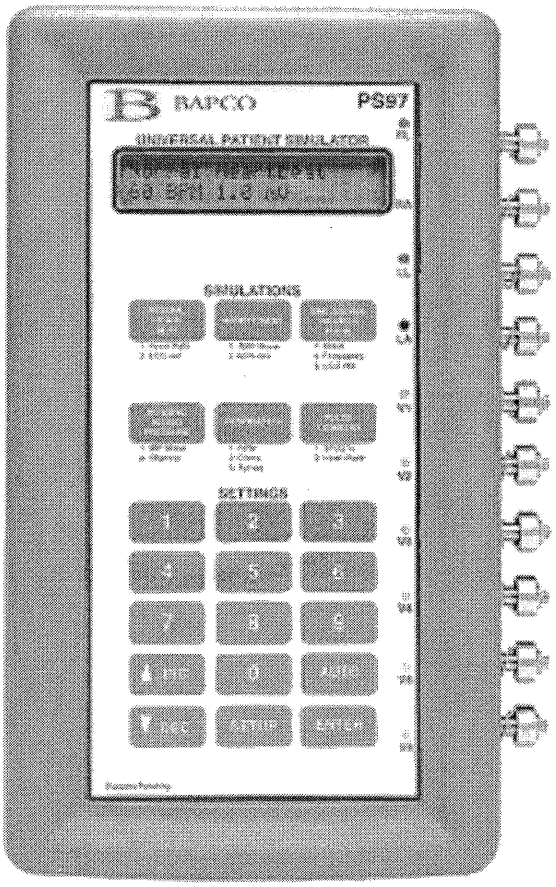
BAPCO PS97
Universal Patient Simulator
Manual



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PS97 UNIVERSAL PATIENT SIMULATOR FEATURES

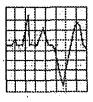
Congratulations on purchasing the most state-of-the-art patient simulator on the market today. Your PS97 is not only guaranteed to perform according to the operating instructions and within printed specifications, but is backed by a lifetime made-right guarantee. If at any time during the lifetime of this product, you or BAPCO determines that this product was not made-right, BAPCO will correct the mistake absolutely free of charge. No other test equipment company, other than our affiliate Sencore, offers this guarantee to assure you that you are purchasing a very high quality tester.

The PS97 is a universal patient simulator especially designed to provide normal and abnormal patient simulations to substitute for the patient when performance testing patient monitors, ECGs, pulse oximeters, thermister type thermometers and any other medical equipment that depends on patient output to operate.

Your PS97 places eight key simulations at your fingertips to make every performance test fast, sure and noise free. Only the BAPCO PS97 simulations are both frequency and amplitude selectable directly from the front panel keyboard to not only provide a dynamic performance test, but to troubleshoot defective products. It also avoids obsolescence by providing waveforms for medical products of the future. These simulations are shown below and are explained in the following pages.

7 Key Simulations at your Fingertips in your PS97 Universal Patient Simulator:

Normal Heartbeat: 20BPM to 350BPM, digitally adjustable rate and amplitude, auto-sequence mode.



Arrhythmias: 14 different waveforms, digitally adjustable rate and amplitude, auto-sequence mode.

Sine/Square/Triangle/Pulse: Digitally adjustable frequency and amplitude, auto-sequence mode.

Invasive Blood Pressure(IBP): Dual channel, 0-300 static, 5 dynamic waveforms, auto-sequence mode.

Pulse Oximetry: Truly universal, auto-sequence mode.

Respiration: Variable rate and amplitude plus apnea, auto-sequence mode (also selection of AAMI standard triangle).

Temperature: 3 selectable constant settings, thermocouple type.

Your PS97 exclusively tests pulse oximeters with direct reading and front panel keyboard control. The test finger provided simply slips into the finger clip and then the monitor displays the preselected oxygen saturation percentage. This unique, patented circuitry, unlike any other pulse oximeter tester, is built into the PS97 test module to generate the direct reading.

Your PS97 is also equipped with an RS232 to produce output into any PC program that you may want to entertain. The BAPCO PC Man software is designed to accept performance data. If you have interest in the PC Man management software, call toll free 1 800 419 4000.

Your PS97 weighs only 2.5 pounds, considerably less than the combined weight of any competitive patient simulator and pulse oximeter. Size is also considerably less. Price is less than any quality pulse oximeter tester on the market. It is like getting a patient simulator free when you purchase the BAPCO PS97.

This operating manual has been computer generated for ease of updating as technology changes. If significant operating changes should take place, a replacement sheet will be sent to you at no charge.

TURNING ON THE POWER

The power switch is located at the top of the PS97. It is labeled OFF, AUTO OFF and ON BATT TEST. These three positions function as follows:

1. OFF: This setting turns off the PS97 power. If the AC Adapter/charger is providing power to the PS97, a message "BATTERY CHARGING" will be displayed.

2. AUTO OFF: Power is applied to the PS97 as soon as the power switch is placed in this position when using the BC194 with the PS97. Power will stay on for the amount of time that the PS97 is programmed to keep it on before turning itself off, to save batteries. If the PS97 is in use and the user is changing functions, power is reset every time that a function is changed to prevent it from being turned off. If the AC ADAPTER/CHARGER powers the PS97, this feature is disabled because there are no batteries to protect.

3. ON BATT TEST: Press the switch to the ON BATT TEST position momentarily to turn unit on. This is a momentary switch setting that does three things: It can be used to reset the AUTO OFF. It will perform a brief battery test and display whether the battery is OK. It will reset the internal microprocessor if it should malfunction.

OPERATIONAL GUIDES

Each function button under SIMULATIONS shows the SETTINGS button to push for sub-functions as memory joggers. The display also guides you through the operation to prevent set-up errors.

PROGRAMMING THE AUTO DELAY

This is the time delay before the PS97 turns itself off. Proceed as follows:

Push the SET UP button on the SETTINGS keypad. The display will show:

1. AUTO-OFF DELAY
2. AUTO-STEP DELAY

Push button 1 on the SETTINGS keypad. The display will then read the delay and direct you to enter the time that you wish, such as:

OFF DELAY = 15 Min
ENTER DELAY:

Select any delay time between 1 and 99 minutes on the SETTINGS keypad. When satisfied, push ENTER.

PROGRAMMING AUTO-STEP

This adjustment sets the time between display information when the PS97 is on AUTO mode. Proceed as follows:

Push the SET UP button on the SETTINGS keypad. The display will show:

1. AUTO-OFF DELAY
2. AUTO-STEP DELAY

Push button 2 on the SETTINGS keypad. This display will then read the delay and direct you to enter the time delay that you wish, such as:

STEP DELAY = 60 Sec
ENTER DELAY:

Select any delay time between 1 and 99 seconds on the SETTINGS keypad. When satisfied, push ENTER.

BATTERY POWER

The PS97 operates on a long-life 40-hour nickel cadmium battery pack. If the battery pack should ever need replacement, simply remove the five screws that hold the under side of the PS97 to make it readily available. The battery pack part number is RB161, should you ever need a replacement.

BATTERY CHARGING

If the battery is allowed to completely discharge itself, the AC/DC Adapter will be required to restart the unit. After charging, the Auto OFF Delay must be reset to the user's desired value (>0).

AC POWER

A special made 6-volt DC output battery eliminator and battery charger is shipped with your PS97. It provides 375 milliamps of power, which is more than adequate to operate the PS97 if the batteries are discharged. This means that

you will never be without power on the job. The AC cord simply plugs into any 120 volt AC outlet. The DC output plugs into a receptacle on the lower bottom of the PS97. The part number is BC194 should you ever need a replacement.

CONNECTING THE ECG LEADS

The ECG patient leads are connected the same as those on other equipment such as your safety tester. They are RL, RA, LL, LA, V1, V2, V3, V4, V5 and V6. They will accommodate any 10 lead ECG. Simply match up the equipment leads as labeled.

PRODUCING MULTIPLE OUTPUTS

Patient monitors and like equipment can be very time consuming to performance test. For this reason, the BAPCO PS97 produces four key functions simultaneously to speed up your work. They are NORMAL HEART BEAT, INVASIVE BLOOD PRESSURE, RESPIRATION AND PULSE OXIMETRY. Here is how it is done.

Set-up the PS97 to the above four functions. Once set up, simply push any or all of these four functions. They will appear on the output simultaneously.

Arrhythmias are not produced at the same time because they are not a standard signal. Sine, square, triangle, and pulse are not produced with this multiple output either because they are primarily used for a frequency response check. Likewise, AUTO is disabled because it would simply cause a great deal of confusion.

NORMAL HEARTBEAT

NEED: In order to dynamically test the operating range of patient monitors, ECGs, and like equipment, the user needs to simulate a normal heartbeat from 20 to 350 beats per minute. They also need to check amplitude reproduction capability from 0.5 to 2 millivolts.

WHAT THE PS97 DOES: The PS97 enables you to simulate a normal heartbeat on an ECG or patient monitor from 20 beats per minute to 350 beats per minute with amplitudes ranging from 0.0 to 2.0 millivolts. The frequency and amplitude can be set from 1 and 2 on the SETTINGS keypad. The frequency can also be automatically cycled over the normal heartbeat range from 60 to 130 beats per minute.

To achieve these results, proceed as follows:

OPERATIONAL GUIDES:

Each function button under SIMULATIONS shows the SETTINGS button to push for sub-functions as memory joggers. The display also guides you through the operation to prevent set-up errors.

1. NORMAL HEARTBEAT: Turn the PS97 on and push the NORMAL HEARTBEAT button under SIMULATIONS. The LCD display will show the current settings of both BPM and amplitude in millivolts as shown.

2. CHANGING BEATS PER MINUTE: If you wish to change the beats per minute, push 1 on the SETTINGS keypad. The display will ask to ENTER BPM. Select the desired beats per minute on the SETTINGS keypad. If you wish to increase the frequency 10 beats per minute at a time, push the button labeled INC. If you wish to lower the beats per minute by 10 beats at a time, push the button labeled DEC.

Once you have selected your frequency, push the ENTER button. This automatically energizes the output terminals.

If you have entered the wrong beats per minute above or below the frequency range, the display will automatically advise you to enter within the range by showing Enter 20-350 BPM.

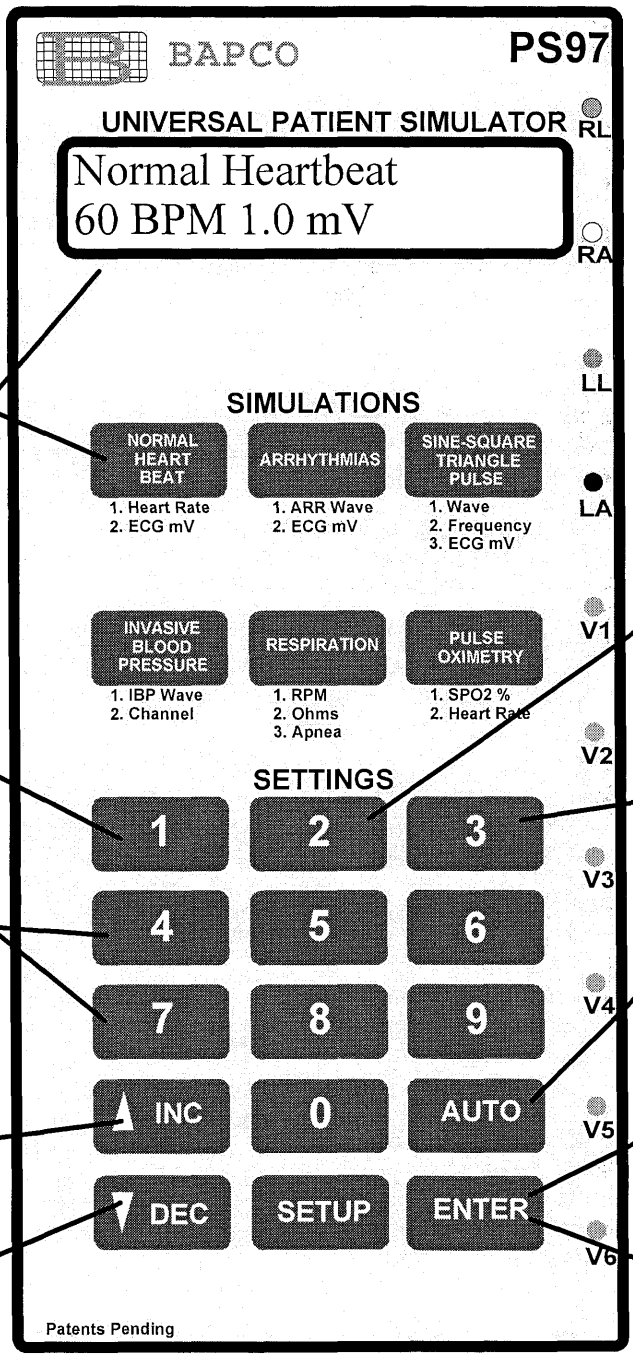
If you wish to advance the beats per minute, in increments of 10, after entering the beats per minute push the button INC. If you wish to lower the beats per minute, in increments of 10, push the down arrow labeled DEC.

If you wish to cycle the beats per minute range in steps of 10 BPM, from the frequency that you have selected to 130 BPM, push AUTO and read the LCD meter as it automatically moves to the next 10 beats. If you select 20 BPM to start with, the PS97 will cycle from 20 to 130 BPM continuously during the first cycle, but will automatically cycle from 60 to 130 BPM after that. If you wish to stop the auto cycle, push NORMAL HEARTBEAT again. Note: The time delay between cycle changes is programmable from 1 to 99 seconds to fit your every need and avoid obsolescence. See page 2.

3. SELECTING AMPLITUDE: To change amplitude, push 2 on the SETTINGS keypad. The display will ask you to "Ent Amplitude". Select any amplitude between 0.0 to 2.0 millivolts by pushing the first button for the whole number and a second button for the number with decimal in front. Example: If you want to select 1.2 millivolts, push the 1 button and then the 2 button.

When you have the amplitude that you desire, push ENTER. This also energizes the output terminals.

If you have selected an amplitude outside the range, the meter will advise you to enter 0.0 to 2 mV.



1. Push, display will read current setting such as shown.

2. Push to change BPM. Display will ask you to enter BPM.

3. Select desired BPM on keyboard.

4. Push to increase selected BPM ten beats at a time.

5. Push to decrease selected BPM ten beats at a time.

8. Push to set amplitude. Display will read Ent Amplitude: __.__

9. Push a button to set a whole number. Push a second button to set a decimal number.

7. Push if you want to cycle from 60 to 130 BPM. Push NORMAL HEARTBEAT to stop.

6. Push to enter frequency selected, if you are outside the BPM range, the display will read Enter 20-350 BPM.

10. Push to enter amplitude. If display reads Enter 0.0-2.0 mV, you are outside the range.

ARRHYTHMIAS

NEED: The most important need is to test the abnormal heartbeat alarms on the ECG or a patient monitor. This function is also very often used to teach nurses and other caregivers.

WHAT THE PS97 DOES: The PS97 produces 14 different arrhythmias/disrythmias to check ECGs, patient monitors and to provide an array of arrhythmias to demonstrate heart patient difficulties. Note that the arrhythmias are not frequency adjustable because they are not uniform and therefore frequency selection would not be meaningful.

Arrhythmia	
AFIB	Arterial fibrillation
2nd Deg Blockage	Second degree A-V block, type 11
RBB Blockage	Right bundle branch block
PAC	Premature arterial contraction
PVC STANDARD	Premature ventricular contraction, standard
PVC EARLY	Premature ventricular contraction, early
PVC R on T	Premature ventricular contraction, R wave on T wave
Multifocal PVCs	Random selection of PVCs
Bigeminy	Normal beat followed by a PVC
RUN of 5 PVCs	Five sequential PVCs
VTACH	Ventricular tachycardia
VFIB	Ventricular fibrillation
Paced	Heart beat with pacer signal present
Fetal/Maternal	Fetal and maternal beats combined.

HOW TO PRODUCE THE ARRHYTHMIAS:

1. GENERATING ARRHYTHMIAS: Turn the PS97 on and press the ARRHYTHMIAS button under SIMULATIONS. The display will show the current selected arrhythmia such as:

Arrhythmia
2nd Deg Block 1.0 mV

2. TO CHANGE ARRHYTHMIAS: Push 1 on the SETTINGS keypad. The lower arrhythmia shown on the LCD is the arrhythmia that is activated. It is followed with an asterisk(*) that serves as a cursor. This arrhythmia is also followed with a downward arrow. The arrhythmia shown on the top of the LCD screen is the previous arrhythmia shown on the arrhythmia list to the left and is followed by an upward arrow.

If you want to generate the arrhythmia at the top of the LCD screen, push the button labeled DEC on the SETTINGS keypad.

If you want to generate the next lower arrhythmia on the arrhythmia list to the left, roll the scroll up by pushing the button on the SETTINGS keypad, labeled INC.

When you have selected the arrhythmia that you want to generate, push the ENTER button to activate the output terminals.

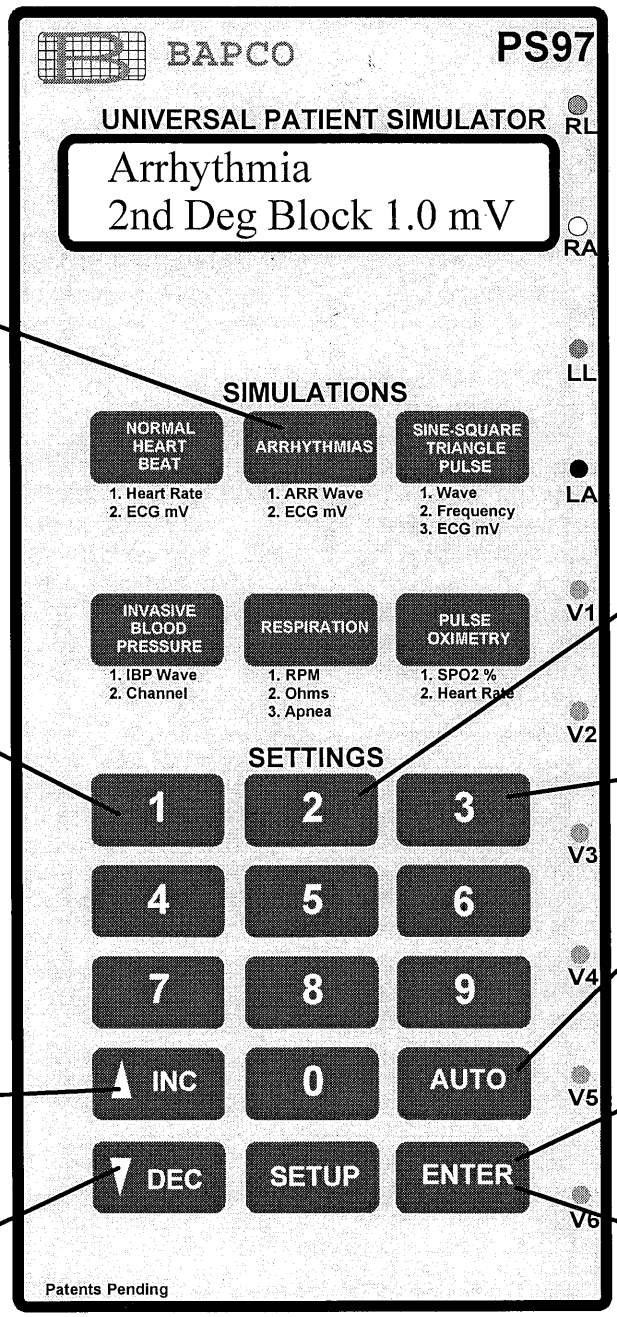
3. AUTO SCROLLING: To produce all 14 arrhythmias in their listed sequence automatically, from top to bottom, after pushing the ENTER button, push the AUTO button on the SETTINGS keypad. The arrhythmias will automatically scroll through the list to the left. To stop the auto cycling, push the ARRHYTHMIA button again.

Time between arrhythmia generations is factory set at about 15 seconds. If you find this too fast for rapid testing or you find it to slow for diagnostic work, reprogram the time as shown on page 2 to your satisfaction.

4. CHANGING AMPLITUDE: The arrhythmia waveforms are adjustable from 0.0 to 2.0 millivolts. To set the amplitude, press 2 on the SETTINGS keypad. The display will ask you to enter the amplitude. Press the first button on the SETTINGS keypad to set the whole number and

the second button to set decimal number. The display shows the amplitude selected.

Press the ENTER button to activate the output terminals. If you select an amplitude that is beyond 2 millivolts, the screen will show ENTER 0.0--2.0 mV to indicate that you must select a new amplitude between these limits.



1. Push, display will read current arrhythmia such as on display above.

2. Push to select arrhythmias. Display will show two arrhythmias such as AFIB ^
2nd Deg Block *v.

4. Push to scroll up.

3. Push to activate arrhythmia at top of screen or to scroll down.

7. Push to set amplitude. Display will read Ent Amplitude: _._

8. Push first button to set a whole number. Push a second button to set a decimal number. View on display.

6. Push to auto scroll from top to bottom. Display will show Auto. Time between is programmable. Push ARRHYTHMIAS to stop.

5. Push to enter arrhythmia of your choice.

9. Push to activate output terminals. Display will read Enter 0.0-2.0 mV if beyond amplitude range.

SINE, SQUARE, TRIANGLE AND PULSE GENERATION

NEED: In order to check tracking accuracy of patient monitors, the user needs to input various established waveforms. These include a sine wave, square wave, triangle and pulse. These waveforms will quickly and visually show whether the monitor is reading correctly or distorting the signal from the patient. Some patient monitor manuals specify the use of these waveforms in their service procedure.

WHAT THE PS97 DOES: The PS97 provides all four waveforms as required, sine, square, triangle and pulse with adjustable frequency and amplitude. This flexibility enables the user to customize the waveforms to whatever has been specified for accurate performance testing. It also protects your investment for tomorrow by preventing obsolescence.

To achieve these results, proceed as follows:

1. SETTING TO WAVEFORMS: Push the SINE-SQUARE/TRIANGLE/PULSE button under SIMULATIONS. The display will show one of the four waveforms, frequency and amplitude such as:

Waveform
Sine 60 CPM 1.0 mV

2. SELECTING THE WAVEFORM: To select one of the four waveforms, push 1 on the keypad. The display will show Select a waveform: SINE SQR TRI PULS. Then, use the INC and DEC arrows to scroll through the list of waveforms. The display will show you the waveform that you have selected such as:

Waveform
Sine 60 CPM 1.0 mV.

3. CHANGING FREQUENCY: If you wish to change the frequency of the wave, press 2 on the keypad. The display will ask you to enter a new frequency as follows:

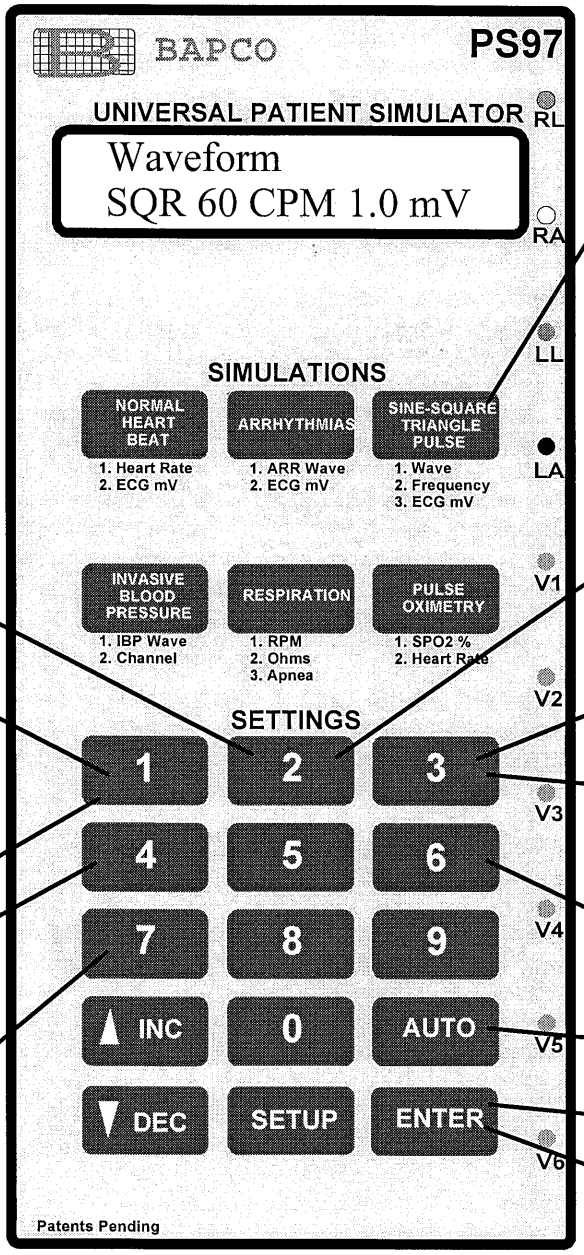
Waveform
Enter CPM:

Use the keypad to select the desired frequency and push the ENTER button on the keypad. If you enter a frequency outside the range of 20 to 350 CPM, the display will advise you of your error by asking you as follows:

Waveform
Enter 20 - 350 CPM.

4. CHANGING AMPLITUDE: If you want to change amplitude, press the 3 button on the keypad. The display will ask you to enter a new amplitude by displaying Waveform Ent Amplitude. To select new amplitude, press the first button to select a full number and a second button to select a number with a decimal in front of it. When changing the amplitude for the Pulse wave, push a third button to add the next number to the right of the decimal. Press a forth button to add the next number to the right of it. (Example: 1.255) When selected, push ENTER to activate the output terminals.

5. AUTO SEQUENCING: If you want to auto-sequence through the four waveforms, push the AUTO button on the keypad. The display will show AUTO. Watch the display as it cycles through a sine wave, then a square wave, then a triangle and then a pulse. The waveforms will be generated at the frequency and amplitude selected. If you wish to auto-cycle at other frequencies or amplitudes, repeat the above procedure.



1. Push to select waveform. Display will read Waveform SQR 60 CPM 1.0 mV

2. Push to select one of four waveforms. Display will read Select a waveform: Sine SQR TRI PULS

3. Push to select a sine wave.

4. Push to select square wave.

5. Push to select triangle wave.

6. Push to select pulse.

7. Push to select frequency.

8. Push number keypad to select frequency.

9. Push to set amplitude.

10. Push one button for whole number, and up to three more buttons to add up to three more numbers to the right of the decimal.

11. Push to enter amplitude.

12. Push to enter and actuate output terminals.

13. Push if you want to auto-cycle the four waveforms.

INVASIVE BLOOD PRESSURE

NEED: The user needs to be able to simulate invasive blood pressure signals, including various static pressures and typical dynamic blood pressure waves. Static pressures range from 0 to 300 mmHG (mm mercury). Dynamic waves are from 120/80, 120/0, 15/10, 25/0, and 10/2. These 14 key waveforms are used to dynamically performance test and trouble shoot invasive blood pressure monitoring equipment.

WHAT THE PS97 DOES: The PS97 enables you to easily simulate dynamic invasive blood pressure waves as well as constant (static) pressures for performance checking and trouble shooting invasive blood pressure monitoring devices by providing 14 different but standard testing waveforms, as shown here.

STATIC 0mmHg	0 mm of Mercury
ART 120/80	Arterial Pressure
LV 120/0	Left Ventricle Pressure
CVP 15/10	Central Venous Pressure
RV 25/0	Right Ventricle Pressure
PAW 10/2	Pulmonary Artery Wedge Pressure

STATIC 10 mmHg
STATIC 20 mmHg
STATIC 40 mmHg
STATIC 80 mmHg
STATIC 100 mmHg
STATIC 200 mmHg
STATIC 250 mmHg
STATIC 300 mmHg

To obtain the most accurate reading of IBP tests BAPCO recommends a five-minute warm-up period before using the PS97.

1. SELECTING INVASIVE BLOOD PRESSURE TESTS: To simulate invasive blood pressures, push the INVASIVE BLOOD PRESSURE button under SIMULATIONS. The display will show one of the non-invasive blood pressure signals and either channel 1 or 2, such as:

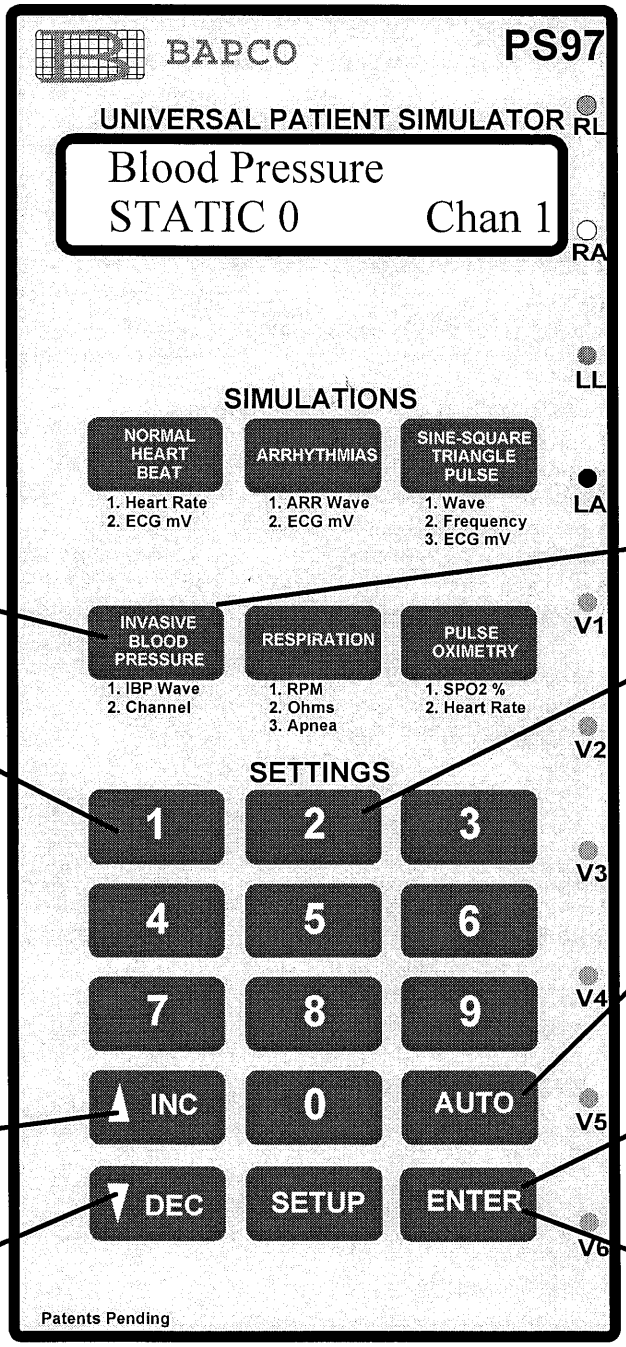
Blood Pressure
STATIC 0 Chan 1

2. SELECTING BLOOD PRESSURE WAVEFORMS: To select a different blood pressure waveform press button 1 on the SETTINGS keypad. Use the INC button to move to the next blood pressure in the list to the left and the DEC button to move to the previous blood pressure in the list. Note that the activated waveform is at the bottom of the two listed and is followed by an asterisk (*) that acts as a cursor. The waveform at the top of the display is the next on the list to scroll down by pushing the DEC down button.

Push the ENTER button when you have reached the waveform that you desire.

3. SELECTING CHANNELS: To change from channel 1 to 2 or from channels 2 to 1, push button 2 on the SETTINGS keypad. Push the ENTER button to enter the channel you desire.

4. AUTO-CYCLING: To produce all 14 invasive blood pressure waveforms, in the sequence shown to the left, from top to bottom, push AUTO after entering the waveform and channel above. The display will show the different waveforms in 15-second intervals. The time between presentations is field programmable from 1 to 99 seconds. See page 2.



1. Push to begin tests. Display will show waveform and channel as shown above.

2. Push to select waveform.

3. Push INC button to go to next IBP wave.

4. Push DEC button to go to previous IBP wave.

5. Push to enter waveform selected.

6. Push to select channel.

7. Push to enter channel.

8. Push to auto-cycle 14 blood pressure waveforms.

9. Push to stop auto-cycle.

RESPIRATION

NEED: The user needs to be able to electrically simulate respiration ranging from zero breaths per minute to 120 breaths per minute, using a delta ohms from 0.1 to 3.0 ohms. They also need to introduce apnea into the respiration 12-second and 32-second intervals to performance test patient monitors and like medical equipment for certain standard tests on some patient monitors.

WHAT THE PS97 DOES: The PS97 enables the user to easily simulate respiration from zero breaths per minute to 120 breaths per minute using delta ohms from 0.1 to 3.0 ohms. It also introduce apnea into the respiration for 12-second and 32-second intervals.

To achieve these results, proceed as follows:

1. SETTING THE FUNCTION: Push the RESPIRATION button under SIMULATIONS. The display will show the current settings for respiration including breathing rate and delta ohms, such as:

Respiration
30 RPM 1.0 Ohms

2. CHANGING THE BREATHING RATE: If you want to change the breathing rate, press the 1 button on the SETTINGS keypad. Press the ENTER button when you are satisfied with the RPM. The display will show the new RPM and ohms such as:

Respiration
80 RPM 3.0 Ohms

3. CHANGING DELTA OHMS: If you want to change the delta ohms setting, press 2. The display will prompt you for a new setting as shown here:

Respiration
Enter Ohms: __.__

Select delta ohms from 0.1 to 3.0 ohms on the SETTING keyboard. Press ENTER if you are satisfied. The display will show the new setting.

Respiration
80 RPM 3.0 Ohms

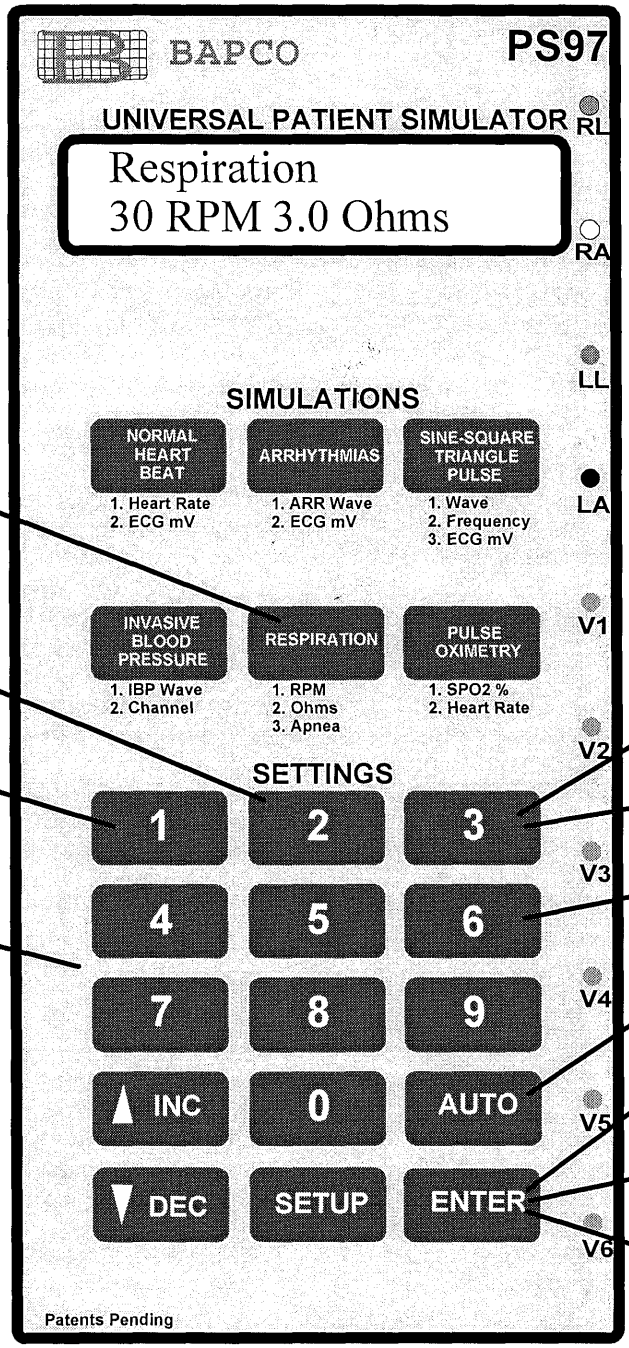
4. AUTO-CYCLING: If you want to auto-cycle through a set of common breathing rates from 5 to 90 RPM, press the AUTO button. The display will start with the breathing rate of 5 and will sequence to 90 in steps of 10 RPM. To stop the auto cycling, push the RESPIRATION button again. See page 2 to reprogram the delay between breathing rates.

5. INTRODUCING APNEA: To introduce apnea into the breathing simulations, press 3 on the SETTINGS keypad. The display will show:

APNEA=12 Seconds
ENTER APNEA:

Use the SETTINGS keypad to select the seconds of apnea delay from 0 to 99 seconds. Press ENTER when satisfied. The breathing simulation will stop at the interval selected and then continue. If you enter any delay above 99 seconds, the display will prompt you by showing:

Enter 0 - 99 Seconds



1. Push to set the function.
2. Push to set new breath rate.
3. Select breathing rate on keypad from 0 to 120 RPM.
4. Push to enter new breathing rate.
5. Push to change delta ohms.
6. Select delta ohms on keypad from .1 to 3.0 ohms.
7. Push to enter new delta ohms.
8. Push to change apnea.
9. Select apnea delay from 0 to 99 seconds.
10. Push to enter apnea delay.
11. Push to auto-cycle from 5 to 90 RPM.

PULSE OXIMETRY

NEED: The user needs to performance check various pulse oximeter equipment including stand-alone pulse oximeters and combination patient monitors. However, each equipment manufacturer has a different light combination and therefore, it becomes important that a universal method is devised that makes all equipment look alike.

WHAT THE PS97 DOES: The PS97 is universal in that it simulates the human finger. The PS97 is an exclusive pulse oximeter that uses a passive system to test patient monitors, unlike competitive pulse oximeter testers. Patent #6,400,973.

To obtain the most accurate reading for SPO2 tests BAPCO recommends a three-minute warm-up period before using the PS97. To achieve these results, plug the special pulse oximeter cable, part# POF197A, into the PULSE-OX receptacle on the top end of the PS97. Insert the other end of the pulse oximeter cable into the patient monitor "finger clip" as you would insert a human finger, and then proceed as follows:

1. SETTING THE FUNCTION: Push the PULSE OXIMETRY button under SIMULATIONS. The display will show the current settings for pulse oximetry for heart rate and oxygen saturation percentage, such as:

Pulse Oximetry
100 % SP02 60 BPM

Be sure to select the monitor manufacturer and set the saturation level and BPM before inserting the test probe into the monitor's finger clip. If you make a manufacturer change while the PS97 probe is in the monitor's SPO2 clip it will saturate the device and give an alarm or incorrect reading.

2. CHANGING SATURATION PERCENTAGE: If you want to change the saturation percentage, push 1 on the SETTINGS keypad. The display will ask you to "Enter SPO2%: ".

Using the SETTINGS keypad, enter a new SPO2 from 60 to 100 %. Press ENTER when satisfied. If you enter outside the range, the display will direct you to

Enter 0 or 60 -100%

Use the INC key to increase the SPO2 percentage to the next higher percentage that is a multiple of 5%. Use the DEC key to decrease the SPO2 percentage to the next lower percentage that is a multiple of 5%. A special 0% setting is used to turn off the simulation signal in the POF197A.

3. CHANGING THE HEART RATE: If you want to change the heart rate, press the 2 button on the SETTINGS keypad. The display will prompt you for a new BPM as shown.

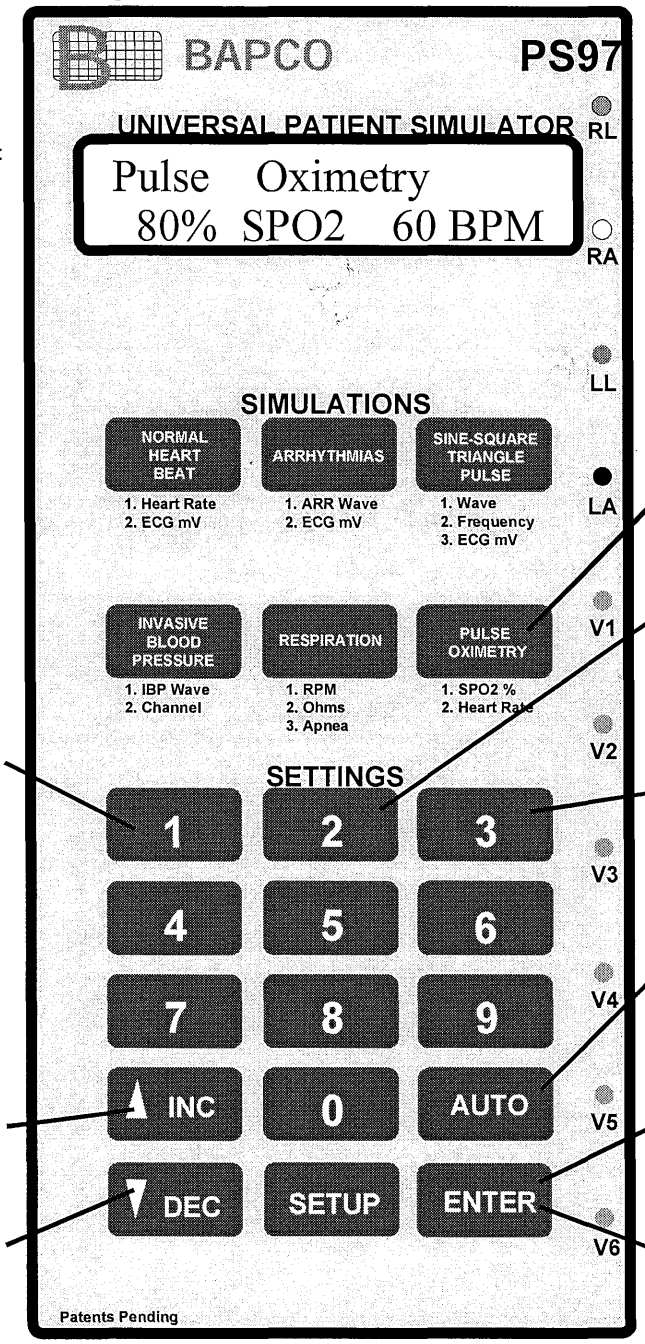
Pulse Oximetry
Enter BPM:

Using the SETTINGS Keypad, enter a new frequency from 35 to 350 BPM. Press ENTER when satisfied. If you enter outside the range, the display will direct you to

Enter 35-350 BPM

4. Changing Manufacturer's Codes: For setting manufacturer's codes, press 3 while in the Pulse Oximetry mode. Continually pressing the 3 key will allow you to cycle through the manufacturer's list. Use the generic 'Pulse Oximetry' setting if the desired manufacturer is not listed.

5. AUTO-CYCLING: If you want to auto-cycle the SPO2 through the set of common saturation percentages, press the AUTO button. The display will show AUTO. The PS97 will sequence the saturation percentages at the selected heart rate, in saturation steps of 5 from 60 to 100 percent saturation.



1. Plug pulse Oximeter cable into PULSE-OX receptacle. Insert other end into patient monitor finger clip.

2. Push to activate. Display will show % of saturation and BPM.

3. Push to change saturation percentage.

4. Push to increase percentage saturation.

5. Push to decrease percentage saturation.

6. Push to enter percentage saturation.

7. Push to change heart rate.

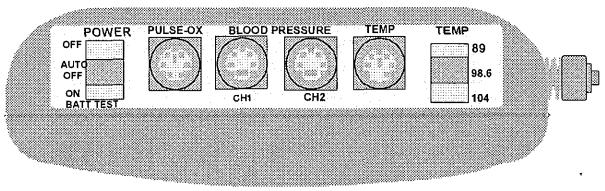
8. Enter frequency from 35 to 350 BPM.

9. Push to enter heartbeat rate.

10. Push to auto-cycle from 60 to 100% saturation.

TEMPERATURE

A temperature jack and selection switch is located on the top end of the PS97. To test your monitor, plug the special BAPCO temperature cable part # TC196 into the temperature jack on the end of the PS97 and into the temperature jack on your monitor. The switch on the top right side of the PS97 has three predetermined temperature ranges (89, 98.6, 104 degrees Fahrenheit) for testing your monitor. The drawing below shows the position of the temperature jack and switch.



NOTE: When ordering a TC196 cable, state the manufacturer and model number of the monitor you are testing.

BAPCO Universal Patient Monitor Analyzer Specifications

Normal Heartbeat
Range: 20 to 350 beats per minute
Resolution: 1 beat per minute
Accuracy: ±1%, ± 0.1mV

Auto feature steps through heart rates 60, 70...130 BPM.

Arrhythmias
AFIB
2nd Degree Block
RBB Blockage
PAC
PVC STANDARD
PVC EARLY
PVC R on T
Multifocal PVCs
Bigeminy
Run of 5 PVCs
VTACH
FVIB
Paced
Fetal/Maternal
Accuracy: ± 1%.

Output level: 0.0 to 2.0 mV
Resolution: ± 0.1 mV
Accuracy: ±1%, ± 0.1 mV

Auto feature steps though all arrhythmia waveforms.

Sine/Square/Triangle/Pulse
Range: 20 to 350 cycles per minute
Resolution: 1 cycle per minute
Accuracy: ±1%

Output Level: 0.0 to 2.0 mV
Resolution: ± 0.1 mV
Accuracy: ±1%, ± 0.1 mV

Auto features steps through waveforms Sine, Square, Triangle and Pulse.

Invasive Blood Pressure
Output level: 0 to 300 mmHg static pressures
Accuracy: 1%, ± 1 mmHg
5 common dynamic waveforms
Dual independent channels

Auto feature steps through all blood pressure waveforms, starting with static 0.

Respiration
Range: 5 to 120 respirations per minute
Resolution: 1 respiration per minute
Accuracy: ±1%

Output level: 0.1 to 3.0 ohms
1000 ohm Baseline
Resolution: ± 0.1 ohm
Accuracy: ± 5%

Auto feature steps through respiration rates 5, 10, 20, 40, 60 and 90 breaths per minute.

Apnea: 0 to 99 seconds

Pulse Oximetry
Range: 35 to 350 beats per minute
Resolution: 1 beat per minute
Accuracy: ± 2%
Output Level: 60% to 100% in 1% increments.
Type: Functional Saturation.

Auto feature steps SPO2 through 60% to 100% in 5% increments.

Temperature
Range: 31.6, 37, and 40 degrees Celsius (89.0, 98.6 and 104.0 degrees Fahrenheit).
Accuracy: ±1%.

General
Size: 15.2 cm (6 in) x 26 cm (10.25 in) x 5.7 cm (2.25 in)
Weight: 1 Kg (2.5 lbs.)
Battery Life: 40 hours of continuous use.
Internal rechargeable NiCad battery.

Environmental
Operational: 15 to 35 deg C (59 to 95 deg F), 0 to 99% RH.
Storage: -29 to 65 deg C (-20 to 150 deg F), 0 to 99% RH.

Accessories & Cables

Included with your purchase:

BC194 External AC Adapter/Charger	$59
POF197A Special Universal Pulse Oximetry Module (Patent #6,400,973)	$595
FORM7183 Operating Manual	$20

Additional accessories that you might need to operate your PS97:

CC119A Carrying Case	$125
BPC195 Invasive Blood Pressure Cable Note: There are two channels each requiring a cable. Order as required stating manufacturer, model number, and any IPM Option numbers that are available. Such as option1-standard input. or option2- 2HP inputs.	$Call
TC196 Temperature Cable Please call with some information shown under Invasive Blood Pressure Cable above.	$Call
PLC190 Safety Tester Interface Cable	$80

What You Should Know About Sp02 Calibration

How PS97 Sp02 Measurements Are Calibrated: BAPCO engineers have done a thorough search to try to find an SP02 standard that covers the PS97 testing range, but can find no standard equipment. Obviously, the lack of a standard will cause groups to disagree. BAPCO is doing all possible to standardize these tests so you know that you are right.

In the 47 years that our parent company Sencore and BAPCO have been in business, we have discovered that the test equipment company must set a standard if none exists. A comprehensive Bio Med survey was made to determine which patient monitors they used the most and which they wanted calibrated to.

From this survey, BAPCO selected representative samples from various manufactures as mutual consent standards to calibrate the PS97 to.

WARRANTY AND SERVICE

BAPCO products are covered by unlimited one-year warranty for both parts and labor. This warranty is extended with a 100 Percent Made Right warranty Lifetime Made-Right guarantee. Simply stated: If at anytime for the lifetime of the product, you do not think that your BAPCO product was made right in the first place, simply advise the factory by dialing 1 800 419 4000 and we will make it right at no expense to you. What's more, we take your word for it.

Your PS97 should be re-calibrated annually by the factory. When returned for its annual check up and re-calibration, any circuit changes that will improve the operation of your PS97 will be installed before calibration free of charge. The same procedure is used for service of any kind. Your products are not only serviced if returned to the BAPCO factory but also updated, calibrated to NIST prime standards, heat run for 10 hours and checked again.

IRONCLAD PERFORMANCE GUARANTEE.

BAPCO warranties that the PS97 Patient Simulator and accessories will perform all tests within specified tolerance and within your testing standards, or you may return for full credit within 30 days of purchase. In effect, you have 30 days for this tester to prove itself to you before you have to make a final decision.

BAPCO
Electro-Compliance Specialists

A SENCORE AFFILIATE
46 years of making high quality test equipment to thousands of satisfied customers.

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